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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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TC 1700

In re Application of : Carl-Åke DÄCKER and Ulla LANGELOTZ  
Serial no. : 10/069,467  
Filed : with an effective filing date of August 18, 2000  
For : DIE-CASTING BRASS ALLOY WHICH IS  
RESISTANT TO DEZINCIFICATION  
Group Art Unit : 1742  
Examiner : Sikyin Ip  
Docket : INTSER P27AUS

The Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

**RESPONSE**

Dear Sir:

[XXX] NO FEES ARE PAYABLE WITH RESPECT TO THIS RESPONSE.

In response to the official action mailed September 16, 2003, please enter the following before reconsideration of this application.

**In the Specification:**

Please amend paragraphs 011, 029, and 030 of the specification as follows in which the specification additions are shown by underlining and the specification deletions are shown by strikeout. Please enter the replacement specification paragraphs into the record of this case.

**In the Claims:**

Please cancel claims 1 and 2, without prejudice or disclaimer of the subject matter therein, in favor of new claims 3 and 4 as follows.

[011] The drawback is, that the beta-phase amount increases in the final casting structure and without a heat treatment it will be difficult to meet the toughest dezincification requirements according to BS-2872, which requires a maximal dezincification depth of 100  $\mu\text{m}$  as a separate value. This is true above all for heavy thicknesses of material, shown in Fig. 3.

[029] Fig. 5 shows the result from investigations of the dezincification depth according to the international standard ISO 6509 for die-cast work pieces having a 6 mm thickness of material as to alloys having a varying Cu content. The result is unambiguous. A dezincification minimum is attained exactly in the area, where the peritectic solidification ceases, at the same time as the amount of beta-phase has not yet become too large. The figure shows a dezincification depth for a maximal separate value as well as median values for a number of measurements, done on the same test object. The result is , that in a relatively wide area the obtained result falls below the requirements regarding the dezincification resistance according to BS-2872 of maximally 100  $\mu\text{m}$  for a separate value.

[030] The object of the invention is to suggest an alloy , which also meets the dezincification requirements for thick die-cast materials, and Fig. 6 shows the result for the corresponding investigation with a material thickness of 16 mm. Also for this material thickness the requirement is met, namely maximally 100  $\mu\text{m}$  for a separate value but within a more narrow interval.

- At a Cu content of lower than 63.6 % the beta-phase agglomerates become so large, that they start to grow together, which results in a too large dezincification.
- At a Cu content of higher than 64.1 % the amount of primary solidification in the alpha-phase becomes so large, that long beta-phase bands develop between the alpha crystals and consequently a deep dezincification is obtained.

The positive results of this balancing of the alloy ingredients are summarized as follows :

- 1) Die-cast material, made of the alloy, meet, without a subsequent heat treatment, the requirements ~~according to BS 2872~~ as to a maximal dezincification depth of 100 µm for a separate value ♦♦
- 2) The alloy can be fine grain-treated with boron in an efficient way, which results in a most fine-grained structure in the finished product, which results in two advantages :
  - The dezincification resistance is further improved, because the size of the beta-phase agglomerates is further reduced ; and
  - The porosity in the die-cast material is distributed more evenly and the separate size becomes smaller, which reduces the risk of a leaky die-cast material and consequently the rejection costs for products, which must meet pressure impenetrability requirements, are also reduced.
- 3) The aluminum content can be kept at a low level, 0.03 – 0.1 weight-%, which means, that the positive effect of the aluminum addition on a die-casting alloy is utilized, but the negative effects are avoided.
  - Positive effects include the strong dezincification effect of aluminum, which means, that also at a low aluminum content the oxygen content in the melt is stable and very low. Aluminum exerts also in small amounts a purification effect in such a way, that it reduces a zinc oxide coating on pouring cups, molding tools and cores ; and
  - Negative effects include the formation in alloys , which include silicon and in which the aluminum content is larger than 0.1 weight-%, of a sticky slag, which consists of aluminum silicates. When a melt is applied with a cup, a portion of this slag will be introduced into the product, in which it forms "hazes" and "balls". These inclusions impair the mechanical properties of the finished product, but, what is worse, they function as capillaries, which means, that the dezincification follows the inclusions, if they reach the surface, which results in deep dezincifications, which by far goes beyond the requirements regarding the dezincification resistance ~~according to BS 2872~~ of a maximally 100 µm ♦♦

## 1-2. (CANCELED)

3. (NEW) A die-casting brass alloy resistant to dezincification, the alloy comprising a composition of:

Cu:	63.0 - 65.0	weight-%
Pb:	1.5 - 2.2	weight-%
Si:	0.6 - 0.9	weight-%
Al:	0.03 - 0.1	weight-%
As:	0.03 - 0.1	weight-%
Ni:	greater than 0.0 but less than 0.5	weight-%
Sn:	max 0.5	weight-%
Fe:	0.1 - 0.5	weight-%
B:	greater than 0 but less than 15	ppm
Other impurities: max. 0.3 weight-%		
Zn:	remainder	

4. (NEW) A die-casting brass alloy having a dezincification resistance lower than 100  $\mu\text{m}$ , characterized by the following composition:

Cu:	63.6	weight-%
Pb:	1.8	weight-%
Si:	0.73	weight-%
Al:	0.07	weight-%
As:	0.06	weight-%
Ni:	0.2	weight-%
Sn:	0.3	weight-%
Fe:	0.25	weight-%
B:	8	ppm
Other impurities: max. 0.3 weight-%		
Zn:	remainder	

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## REMARKS

Further to the Information Disclosure Statement mailed under an Express Mailing date of February 21, 2002, the Applicant forwarded an Addendum to that Information Disclosure Statement, on March 7, 2002, which was accompanied by the three (3) missing references. A copy of the returned postcard, the Addendum and the PTO Form 1449 is attached. In view of the above, the Applicant respectfully submits that the previously filed Information Disclosure Statement was submitted in accordance with the provisions of 37 CFR 1.97 and should have been substantively considered in its entirety. Such consideration is respectfully requested at this time.

The above newly entered/amended paragraphs of the specification overcome some informalities noted in the specification on file. Specifically, the improper incorporation of the subject matter "BS 2872" found in paragraphs [011], [029], and [030] is addressed by the cancellation, throughout the specification, of reference to that publication. As the necessary requirements, referred to as the "BS 2872" publication, are summarized in the specification, the Applicant believes that no further incorporation of subject matter from that publication into the specification are necessary. If the Examiner still believes further amendment to the specification is required, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

Claims 1 and 2 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for the reasons noted in the official action. The subject matter of the rejected claims is accordingly revised and rewritten as new claims 4 and 3, respectively. The newly entered claims are now believed to particularly point out and distinctly claim the subject matter regarded as the invention, thereby overcoming all of the raised § 112, second paragraph, rejections.

Next, claim 1 is rejected, under 35 U.S.C. § 103, as being unpatentable over WO 89/08725 or SE 358415. The Applicant acknowledges and respectfully traverses the raised obviousness rejection in view of the following remarks.

The Applicant thanks the Examiner for indicating that claim 2 is objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claim(s). In accordance with this indication, the subject matter of claim 2 is revised and rewritten new as independent claim 3 and that newly entered independent claim is now believed to be allowable.

With respect to newly entered claim 4, as noted by the Examiner, neither of the WO 89/08725 or SE 358415 references disclose the use of B in their compositions and SE 358415 does not disclose the use of Ni. As currently claimed both independent claims 3 and 4 include the limitation of the use of both B and Ni in the composition. Additionally, neither of the WO 89/08725 or SE 358415 references disclose the dezincification depth as currently recited in independent claim 4.

In order to emphasize the above noted distinctions between the presently claimed invention and the applied art, independent claim 4 recites the feature "a die-casting brass alloy having a dezincification resistance lower than 100  $\mu\text{m}$ ". Such features are believed to clearly and patentably distinguish the presently claimed invention from all of the art of record, including the applied art.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the above claim amendments, the Applicant respectfully submits that further comments concerning the applied prior art is not believed necessary. The Applicant also notes the remaining prior art cited in the official action. As none of that additional art is applied by the Examiner against the claims of this application, the Applicant is not providing any comments concerning that art as well.

In view of the above newly rewritten claims and remarks, it is respectfully submitted that all of the raised rejection(s) should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejection(s) or applicability

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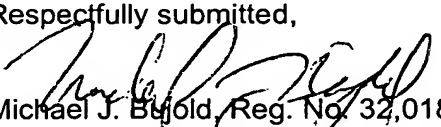
of the WO 89/08725 or SE 358415 references, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching, suggestion and/or disclosure is not present in the applied references, the raised rejection should be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field, the Applicant respectfully requests the Examiner to enter an affidavit substantiating the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

In view of the foregoing, it is respectfully submitted that the raised rejection(s) should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,

  
Michael J. Bujold, Reg. No. 32,018

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#### **CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal Service, with sufficient postage, as First Class Mail in an envelope addressed to: Director of the United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. November 21, 2003.

By: 

Print Name: Michael J. Bujold